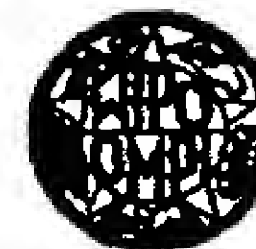


PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



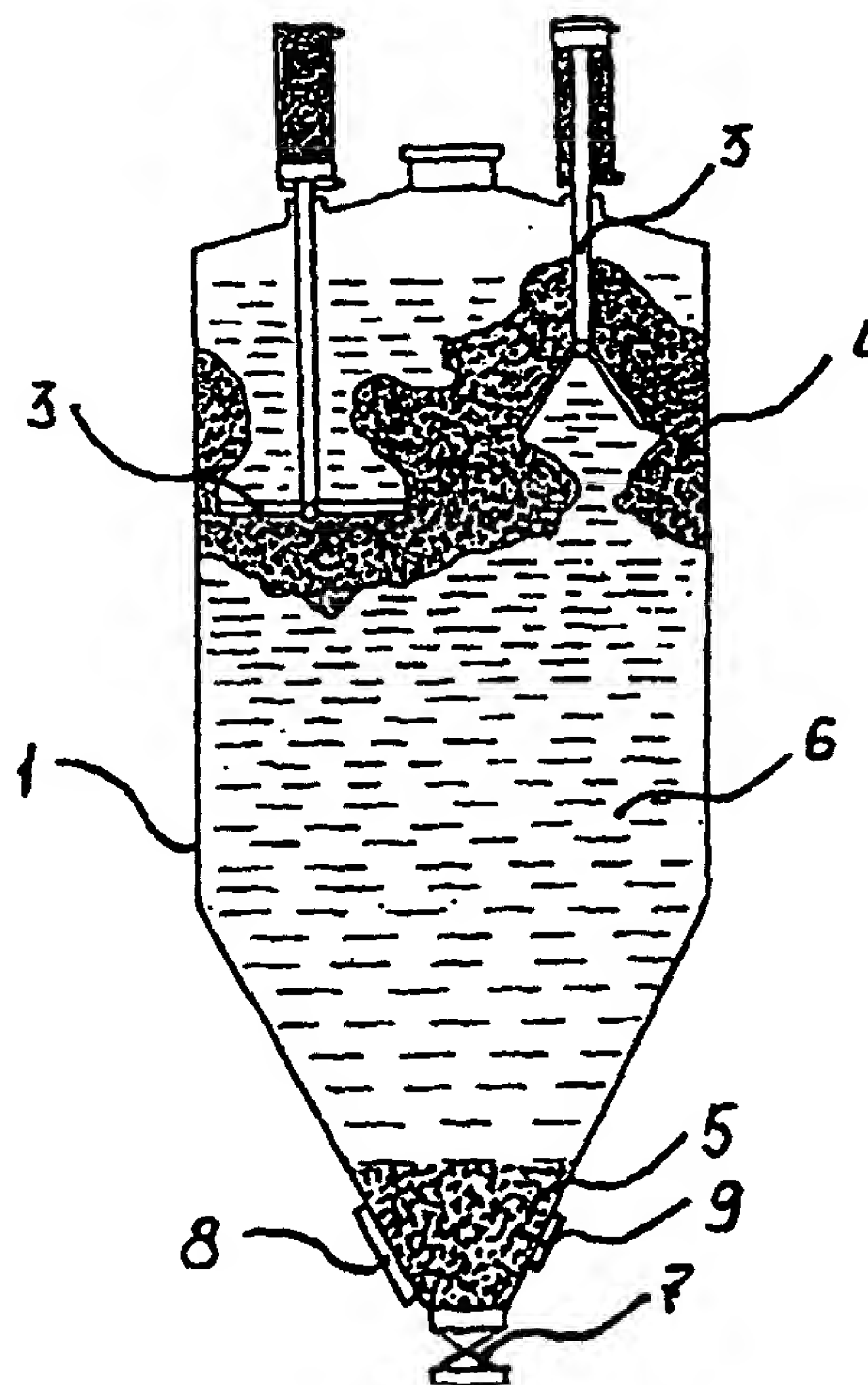
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : C12G 1/02	A1	(11) International Publication Number: WO 97/44437 (43) International Publication Date: 27 November 1997 (27.11.97)
(21) International Application Number: PCT/IL97/00157 (22) International Filing Date: 15 May 1997 (15.05.97) (30) Priority Data: 118338 20 May 1996 (20.05.96) IL (71)(72) Applicants and Inventors: PAPIKIAN, Arkadi [IL/IL]; Apartment 7, 25 Ilanot Street, 46565 Herzeliya (IL). PA- PIKIAN, Alla [IL/IL]; Apartment 7, 25 Ilanot Street, 46565 Herzeliya (IL).		(81) Designated States: AU, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: METHOD OF PRODUCING RED WINE

(57) Abstract

The invention presents a new method of fermenting the must of red grapes during the production of red wines. The new method is based upon changing the composition of the must during alcoholic fermentation by means of removing the sediments from the bottom of the fermentation vat during fermentation. These sediments are comprised primarily of grape seeds and solid particles of pomace. This operation reduces the extraction of tannins from the grape seeds, particularly during the punching down of the cap or the mixing of the fermenting must, thereby obtaining wine with optimum astringency. The astringency of the press wine is also reduced thereby requiring no additional treatment and rendering it more economical to produce. Finally, this method provides the ability to extend the contact of the fermenting juice and the young wine with the grape skins without risk of producing wine with too much, and not optimal, astringency.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

METHOD OF PRODUCING RED WINE

The invention described in this document applies to the field of wine production. More specifically to the methods of fermenting red grape must. For the purpose of this document the fermentation of red grapes implies fermentation of the mixture of grape juice, stem fragments, grape skins, seeds and pulp (collectively called the "must").

The technology of red table wine production is based on the extraction by the fermenting juice of a number of elements from the solid components of the must, which determine the color, aroma, varietal character and astringency. The astringency of the red wine is a function of the amount of tannins which are extracted from the skins and primarily from the seeds.

The classic technology for producing red table wine comprises of the following operations:

- 1 - Crushing the grapes, thereby splitting the skins, releasing the juice thereby enabling yeast activity and fermentation.
- 2 - Removing the stems and leaves in order to avoid excessively high tannin levels in the wine.
- 3 - Introducing an active yeast starter into the must.
- 4 - Fermenting the must with multi-mixing of the fermenting juice and the cap that forms at the top of the fermentation vat during fermentation and consists of solid grape particles.
- 5 - Removal of the free-run wine from the fermentation vat.
- 6 - Pressing the grape mass, or pomace. The resulting "press wine" is high in tannins and color pigments. The volume of press wine produced is usually between 15 and 25% of the total volume of wine produced.

There is a known method of producing red wine in which the fermenting must is held in the fermentation vat until a cap of solid components of the must forms at the top of the fermentation vat as a result of alcoholic fermentation. Then the formed cap is punched down into the fermenting must in order to mix them. This activity of holding and punching down the cap may occur a number of times (usually 3 to 6 times per day) during the fermentation process (usually 4 to 12 days) until the preset parameters have been obtained. At this point the wine is drawn off from the fermentation vat. Finally the sediment of seeds and other solid particles that formed on the floor of the vat during the fermentation process, together with the cap are transferred to a wine press in order to remove the press wine.

The main problem with this method is the extraction of excessive quantities of tannins originating from the seeds. These tannins also add to the astringency of the wine, but also contribute unpleasant, and sometimes undesirable bitterness.

The authors of this invention have experimentally proved that tannins are extracted most intensively in the course of mixing the fermenting must with the cap of grape skins formed at the top of the fermentation vat during fermentation. In addition, the wine produced after pressing (the "press wine") is characterized by excessive astringency and requires additional treatment thus decreasing the efficiency of wine production.

The object of the invention is to develop a method of fermenting the must of red grapes in which it is possible to reduce the extraction of tannins from the seeds thereby obtaining wine with optimum astringency. In addition, the astringency of the press wine is also reduced thereby requiring no additional treatment and therefore more economical to produce.

The set task is achieved by maintaining the mixture of must and yeast starter in the fermentation tank until a cap solid particles, comprising primarily of grape skins, forms at the top of the fermentation vat as a result of alcoholic fermentation. The formed cap is then punched down and mixed with the fermenting juice. Prior to punching the cap down, once again, into the fermenting juice, the sediment which has formed at the bottom of the fermentation vat is removed. The sediment comprises primarily of grape seeds and other solid particles of pomace. The operations of holding and punching the cap down into the must, and removing the sediment from the bottom of the fermentation vat are repeated until the preset parameters of the wine are obtained. Once the preset parameters have been obtained the wine is separated from the solid particles.

The essence of the invention is illustrated in the following figures:

Note: Figures 1 and 2 refer to traditional upright fermenters and
Figures 3 and 4 refer to rotary fermenters.

Figure 1 schematically shows the traditional fermenter for must fermentation in accordance with the proposed method, filled with the initial mixture (grape must and yeasts).

Figure 2 shows the mixture during fermentation. The cap that has formed at the top of the fermentation tank is being punched down, and, sediment comprising primarily of grape seeds and other solid particles have formed at the bottom of the tank.

Figure 3 schematically shows the rotary fermenter for must fermentation in accordance with the proposed method, filled with the initial mixture (grape must and yeasts).

Figure 4 shows the mixture during fermentation. The cap that has formed at the top of the rotary fermenter is being mixed with the fermenting juice by rotation, and, sediment comprising primarily of grape seeds and other solid particles have formed at the bottom of the tank.

Method of Operation

- 1 - The fermentation tank (1) as seen in Fig 1 and Fig 3 is filled to about 80% of capacity with the red grape must.
- 2 - Active yeast starter is then added.
- 3 - The mixture of must and active starter (2) is mixed by the use of the two plungers (3) as in Fig 1, or by rotation as in Fig 3 and is left to ferment.
- 4 - During fermentation the fermenting juice extracts from the solid particles of the must (primarily from the seeds) the tannins which determine the astringency of the wine. The fermenting juice also extracts other elements which determine the color, density, aroma and other varietal characteristics.
- 5 - Carbon dioxide gas, escaping during the course of fermentation causes flotation of grape skins and pulp, together form the cap (4) as seen in Fig 2 and in Fig 4.
- 6 - Denser material, comprising of primarily of the grape seeds settle at the bottom of the fermentation tank and form a sediment (5).
- 7 - At this stage there are three different matter levels in the fermentation tank: the cap (4), fermenting must (6) and sediment (5).
- 8 - After the first formation of the cap (10 to 24 hours following the filling of the fermentation tank) the sediment expulsion valve, (7) in Fig 2 and in Fig 4, is opened. Once the sediment (5) has been drawn off, the valve must then be closed.
- 9 - The cap (4) is then mixed with the fermenting must (6) by punching down the cap or rotation of the tank.
- 10 - During the further fermentation of the must, the quantity of tannins extracted will be reduced due to the decreased content of grape seeds.
- 11 - After the next holding, when the cap forms again, the sediment is removed by opening the sediment expulsion valve, (7) in Fig 2 and in Fig 4. When the sediment has been removed the valve is closed and the cap is mixed with the fermenting juice by punching down the cap or rotation of the tank.
- 12 - The above operations (as described in paragraph 11) is repeated 1 to 6 times per day during the 4 to 12 days of fermentation, until the young wine obtains the preset parameters.

Thus permanent decrease in the content of grape seeds is obtained in the fermentation vat and consequently a decrease in the extraction of tannin, which prevents excessive astringency in the wine. It is important to carry out the removal of the sediment (5) from the fermentation vat prior to punching the cap and mixing it with the fermenting must, since, as it has been experimentally proven by the authors of the invention, the most intensive extraction of the tannins occur during the punch down and mixing process.

In addition, in order to decrease any loss of wine it is expedient to separate the fermenting must (6), flowing out of the fermentation tank during sediment removal, from the removed sediment (5) with the use of any known method and to return the must back to the fermentation tank.

The young wine is removed from the fermentation tank via the expulsion valve, (9) in figure 2 and in figure 4, for further storage or treatment. The sediment, composed primarily of grape skins is removed via the fermentation vat door (8) for pressing.

The press wine produced under the proposed method features lower astringency as compared with conventional known methods. This is accounted for by the decreased content of grape seeds in the pressed sediment mass.

GLOSSARY

CAP The mass of grape skins which accumulates at the top of the fermentation vat, above the juice, during fermentation.

FREE-RUN Juice or wine which drains out of the fermentation vat under the natural weight of the fruit, without pressing. Widely considered to be of better quality than the press wine. Consists of 60 to 70 percent of the total juice available.

MACERATION Refers to the period during which the must or wine remains in contact with the grape skins. Alcohol acts as a solvent, extracting color, tannins and aroma from the skins. Extended contact also extracts bitter tannins from the grape seeds.

MUST The mixture of grape juice, stem fragments, grape skins, seeds and pulp derived from crushing the grapes prior to fermentation.

POMACE Residue of stem fragments, skins, seeds and dead yeast cells left after fermentation.

PRESS WINE Dark red wine squeezed from the pomace after the free run has been drained off. Inferior to free-run wine and often extremely tannic. Consists of 30 to 40 percent of total juice available.

PUMPING OVER refers to fermenting must being drawn over the cap of the skins that have formed at the top of the fermentation vat.

TANNINS A group of chemicals found in grape skins, seeds and stems that confer astringency and bitterness to the taste of the wine and play a major role in the ability of the wine to age.

-6-

Claims:

1. The method for the production of red wine according to which the mixture of grape must and starter is held in the fermentation vat until a cap of solid particles forms at the top of the fermentation vat as a result of alcoholic fermentation, the formed cap is then mixed with the fermenting must. This process of holding and mixing is repeated until wine with the preset desired parameters is obtained. The wine is then separated from the solid particles of the must. Prior to mixing the formed cap with the fermenting must, the sediment of grape seeds and other solid particles is removed.
2. The operation of removing the grape seeds and other solid particle sediment, as described in paragraph 1 above, is implemented directly prior to the next punching of the cap and mixing it with the fermenting must.
3. The method according to paragraphs 1 and 2, from the sediment of seeds and other solid particles which have been removed from the fermentation tank, fermenting must is separated and returned to the fermentation tank.
4. The method, as indicated above, is described in detail in the specifications enclosed.

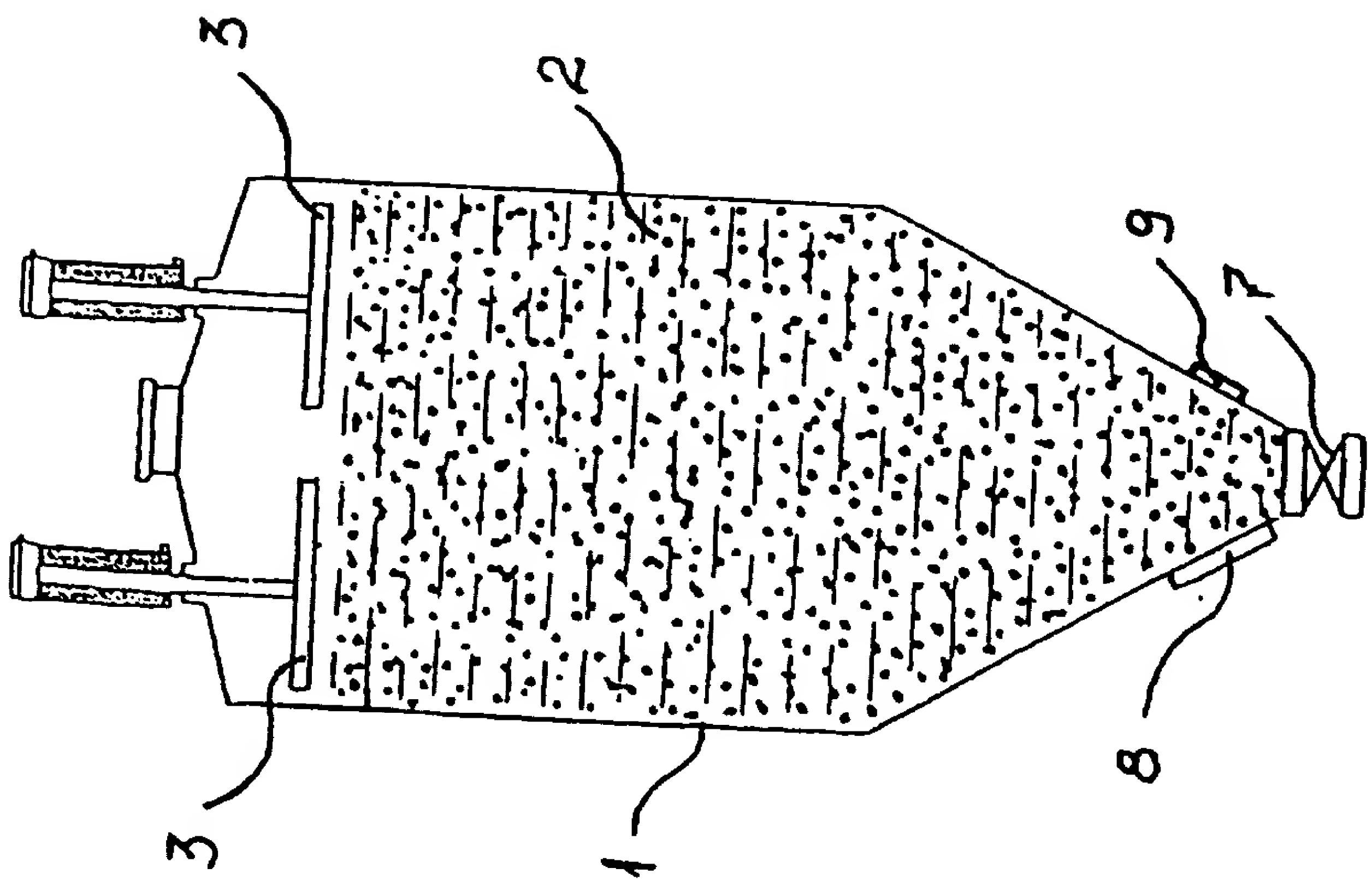


FIG. 1

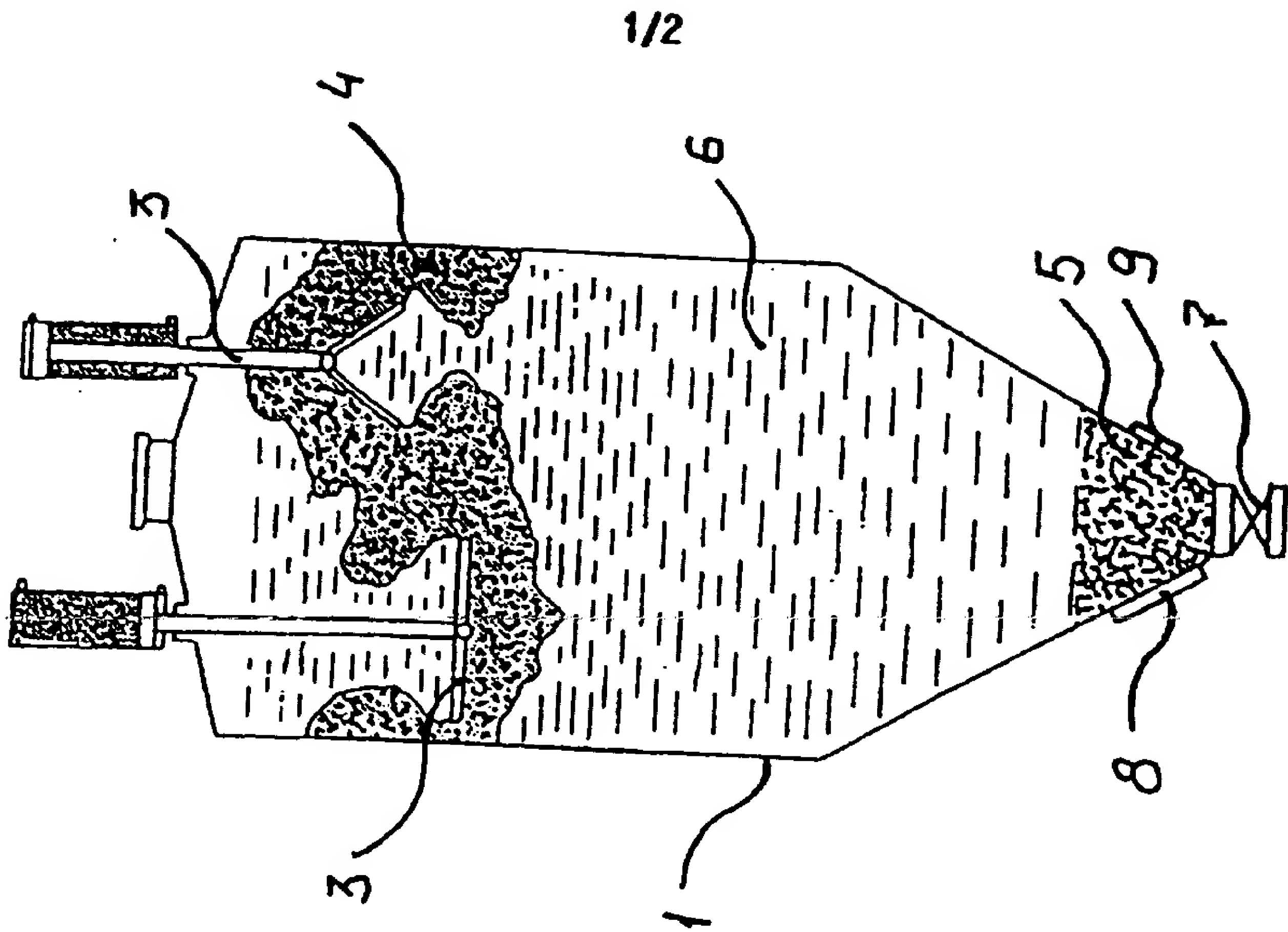


FIG. 2

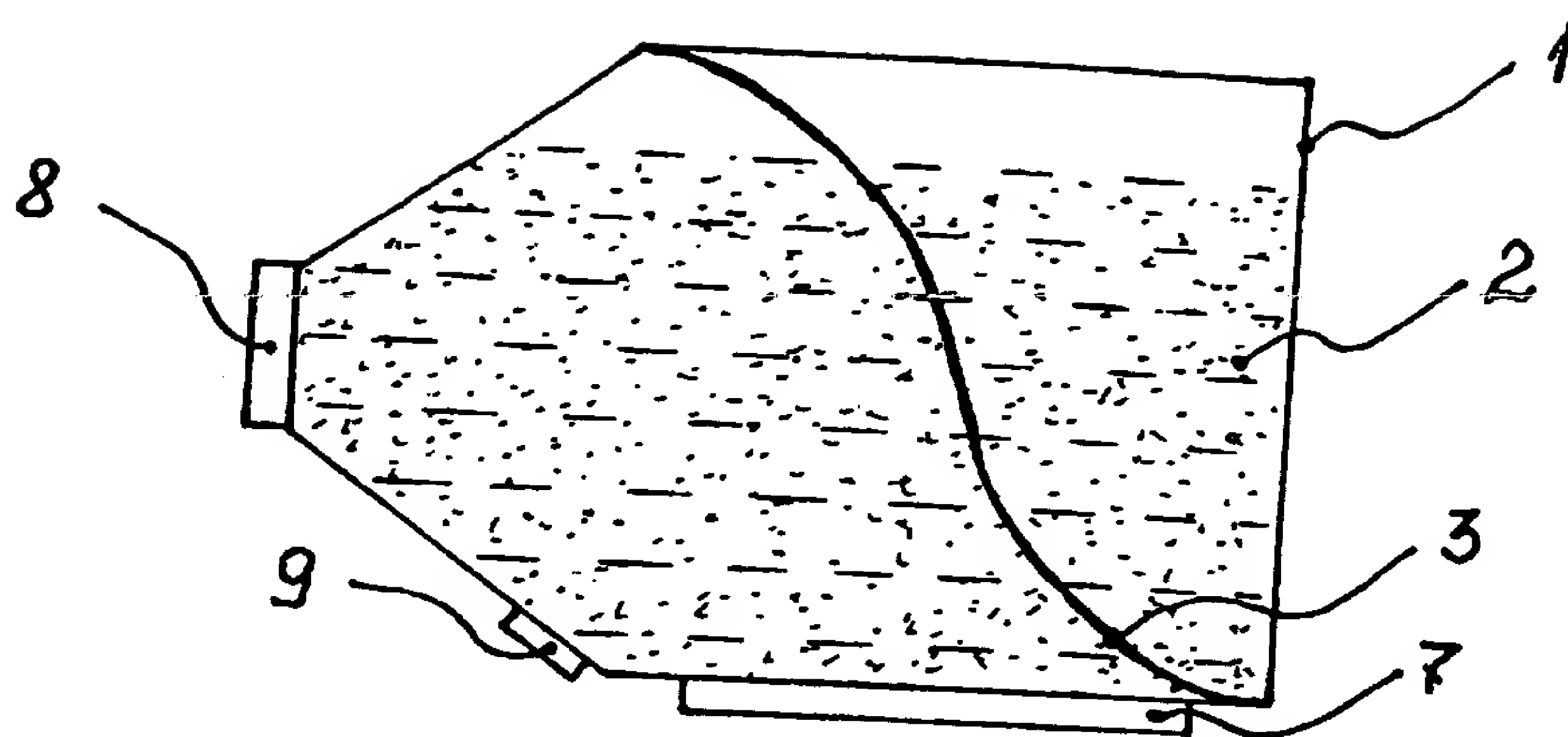


FIG 3

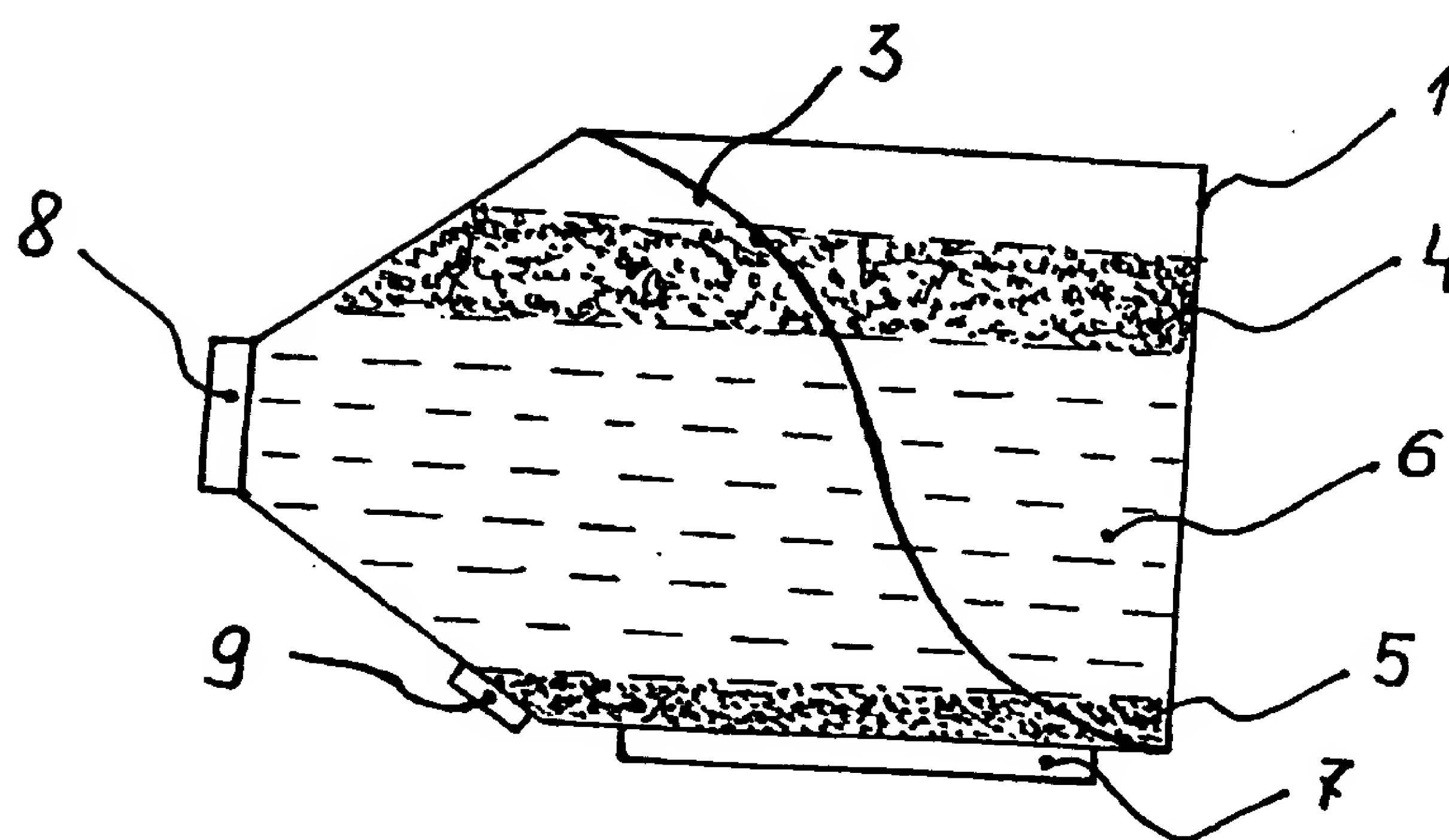


FIG 4

INTERNATIONAL SEARCH REPORT

Inter. nal Application No
PCT/IL 97/00157

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C12G1/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C12G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 263 077 A (SABATINO MARINO DI) 6 April 1988 see claims; figures	1
Y	US 4 317 410 A (PRUNET ACHILLE) 2 March 1982 see column 5, line 3 - line 33; figure 1	1
A	DE 27 08 697 A (PICKROTH GEB LIEDTKE ILSE) 7 September 1978	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- * "A" document defining the general state of the art which is not considered to be of particular relevance
- * "E" earlier document but published on or after the international filing date
- * "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- * "O" document referring to an oral disclosure, use, exhibition or other means
- * "P" document published prior to the international filing date but later than the priority date claimed

- * "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- * "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- * "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- * "A" document member of the same patent family

Date of the actual completion of the international search

29 August 1997

Date of mailing of the international search report

23.09.97

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+ 31-70) 340-3016

Authorized officer

Bevan, S

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/IL 97/00157

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0263077 A	06-04-88	NONE	
US 4317410 A	02-03-82	FR 2433475 A FR 2449054 A	14-03-80 12-09-80
DE 2708697 A	07-09-78	NONE	